REMARKS

Claims 55-61 and 80-82 are pending in the application with claim 55 amended herein, claims 62-68 and 79 cancelled herein, and new claims 81 and 82 added herein. The amendment to claim 55 is not related to the statutory requirements of patentability. Instead, such amendment merely now more positively expresses limitations that were previously inherent in such claim and, accordingly, is not for the purpose of narrowing and does not effectively narrow the scope of claim 55. As such, any new ground of rejection of claim 55 cannot be considered as necessitated by Applicant's amendment.

Claims 55, 56, and 58-61 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Chan (U.S. Patent No. 6,100,195) in view of Takiar (UK 2184288). Claim 57 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Chan in view of Takiar and McTeer. Applicant requests reconsideration.

New claim 81 sets forth an integrated circuit forming method that includes, among other features, forming a first layer containing copper, forming a second layer containing a second metal different from copper over the first layer, the second metal containing palladium, and incorporating palladium into an intermetallic layer consisting of copper and palladium by annealing the first and second layers at a temperature of greater than 400 to about 500 °C. The intermetallic layer has a thickness of from about 50 to 150 Angstroms. The copper and palladium of the intermetallic layer are held

together by metallic bonding. After the annealing, the method includes removing any second metal that is not incorporated into the intermetallic layer, exposing the intermetallic layer, and forming a conductive connection directly to the exposed intermetallic layer. Comparison to claim 55 reveals that claim 55 is generic to claim 81 and that claim 81 incorporates the subject matter of claims 56 and 57 and adds other limitations. Claim 81 is supported by Figs. 1-6 and the text associated therewith in the present specification.

Pages 2-3 of the Office Action allege that Chan discloses many of the limitations that are now set forth in new claim 81, including the intermetallic layer, but acknowledges that Chan does not disclose the intermetallic layer thickness. The Office Action relies upon Takiar as allegedly disclosing the claimed thickness. Page 5 of the Office Action acknowledges that Chan does not disclose the annealing temperature and relies upon McTeer as allegedly disclosing the claimed annealing.

Review of Chan reveals that it does not disclose or suggest any intermetallic layer, much less the claimed intermetallic layer consisting of copper and palladium. Throughout Chan, but in particular in column 4, lines 50-55, Chan consistently refers to alloy 61 as an alloy and does not provide any indication of an intermetallic layer. As may be appreciated at least from page 8, lines 6-15 of the present specification, a metal alloy is not necessarily an intermetallic layer held together by metallic bonding, as claimed. Some alloys are not intermetals. The only reference throughout

the entire text of Chan to an intermetallic layer is the Inter-Metallic Dielectric (IMD) layer 64. However, layer 64 merely constitutes a dielectric "between" metal layers (i.e., "Inter-Metallic") instead of a type of metal alloy wherein the constituents are held together by metallic bonding (i.e., intermetallic). Accordingly, Chan cannot be considered to disclose or suggest the claimed intermetallic layer consisting of copper and palladium.

Applicant notes that at least column 4, lines 50-55 of Chan refer to a copper-palladium alloy, however, such disclosure does not inherently suggest a copper-palladium intermetal. The mere fact that a certain thing may result from a given set of circumstances is not sufficient to establish inherency. Instead, some basis in fact and/or technical reasoning must reasonably support a determination that the allegedly inherent characteristic necessarily flows from the teachings of a prior art reference. Those of ordinary skill recognize that the well-known phase diagram of a copper-palladium binary alloy system shows that solid phases of copper-palladium alloy primarily exist as a solid solution. Those of ordinary skill also recognize that a solid solution is not an intermetal material.

However, depending on composition and temperature, it is possible for a copper palladium alloy to form intermetal materials. It follows that mere disclosure of copper palladium alloy does not necessarily disclose copper palladium intermetal material. This is especially true since column 4, lines 50-55 of Chan merely describe an annealing temperature of 200 to 400 °C. Claim 81 expressly sets forth annealing at greater than 400 to about 500 °C

with the specific objective of forming an intermetallic layer. Accordingly, Chan cannot be considered to disclose expressly the claimed intermetallic layer consisting of copper and palladium, nor is such a layer inherently disclosed in Chan. At least for such reasons, claim 81 is patentable.

The Office Action relies upon McTeer as allegedly disclosing the annealing temperature that is also set forth in claim 81. However, Applicant notes that the present application claims priority to an earlier application and that McTeer qualifies as prior art only under 35 U.S.C. 102(e). McTeer and the claimed invention were, at the time the claimed invention was made, owned by Micron Technology, Inc. or subject to an obligation of assignment to the same. Accordingly, McTeer cannot preclude patentability of claim 81.

Page 5 of the Office Action alleges that those of ordinary skill would be motivated to modify Chan in view of Takiar with the teachings of McTeer by annealing Chan's alloy layer 61 at 440 to 480 °C to reduce reflectance or form an anti-reflective coating. Obviousness may be established by a combination of references, but not unless there is some motivation in the art to support the combination. Review of column 3, line 3 to column 4, line 5 of McTeer reveals that the relied upon annealing pertains only to titanium-aluminum compounds. While the McTeer annealing temperature may be sufficient to reduce reflectance or form an anti-reflective coating using titanium-aluminum compounds, no support exists for the proposition that the McTeer annealing would produce the same effect for Chan's alloy 61 containing copper and palladium.

The copper palladium alloy 61 of Chan does not contain any elements in common with the McTeer titanium-aluminum metal stacks that are annealed. Those of ordinary skill do not have any expectation of success in reducing reflectance or forming an anti-reflective coating using the McTeer temperatures to process a completely different composition than disclosed in McTeer, i.e. copper palladium alloy 61 of Chan. Accordingly, the motivation alleged by the Office for combining McTeer with Chan in view of Takiar is invalid. At least for such reasons, claim 81 is patentable.

Page 3 of the Office Action relies upon Takiar as allegedly disclosing the claimed intermetallic layer thickness of from about 50 to about 150 Angstroms. The Office Action acknowledges that Takiar does not explicitly disclose the claimed composition, but alleges that discovery of optimal or workable ranges by routine experimentation is not inventive in the absence of unexpected results. However, the Office Action relies upon legal grounds that do not apply in the current circumstances.

Claim 81 sets forth a thickness of 50-150 Angstroms for an intermetallic layer consisting of copper and palladium. By comparison, Takiar allegedly sets forth a thickness of 80-300 Angstroms for a layer containing palladium. Accordingly, the deficiency in Takiar is not that it discloses a different thickness range, instead, Takiar discloses a different composition. It is thus irrelevant whether or not a thickness of 50-150 Angstroms of palladium may be discovered by routine experimentation since Takiar fails to disclose or suggest that its 80-300 Angstrom thickness applies

to the claimed intermetallic layer consisting of copper and palladium. None of the cited references disclose or suggest a thickness for the claimed intermetallic layer consisting of copper and palladium. A combination of references cannot be considered to disclose or suggest subject matter that is absent from all references.

To the extent that the Office proposes replacing Chan's copper palladium alloy 61 with Takiar's palladium layer 30 having a thickness of 80-300, Applicant asserts that no suggestion or motivation exists in the art for such a substitution. Fig. 2G of Chan and the accompanying text in column 4, lines 56-60 expressly describe removing any palladium, leaving behind alloy 61 containing copper-palladium. Substitution of Chan's alloy layer 61 with Takiar's palladium layer 30 would result in removal of palladium layer 30 during the selective etching shown in Fig. 2G. Accordingly, the proposed substitution would render Chan inoperable for its intended purpose. At least for such reason, no suggestion or motivation can be considered to exist to make the proposed modification. Claim 81 is thus patentable.

In summary, Applicant asserts that none of the cited references, in including Chan, disclose or suggest the claimed intermetallic layer consisting of copper and palladium. Also, none of the cited references, including McTeer, disclose or suggest annealing the claimed first and second layers at a temperature of greater than 400 to about 500 °C to form an intermetallic layer. Further, none of the cited references, including Takiar, disclose or suggest an intermetallic layer consisting of copper and

palladium having thickness of from about 50-150 Angstroms. At least for such reasons, Applicant asserts that the cited references, considered alone or in combination, fail to disclose or suggest every limitation of claim 81.

Claim 55 sets forth an integrated circuit forming method that includes, among other features, forming a first layer containing copper, forming a second layer containing a second metal different from copper over the first layer, the second metal containing palladium, and incorporating palladium into an intermetallic layer containing copper and palladium. The intermetallic layer has a thickness of from about 50 to 150 Angstroms. The method includes removing at least a portion of any second metal that is not incorporated into the intermetallic layer, exposing the intermetallic layer, and forming a conductive connection directly to the exposed intermetallic layer.

As may be appreciated from the discussion above regarding the deficiencies of Chan and Takiar as applied to claim 81, neither reference discloses or suggests the claimed intermetallic layer containing palladium and copper. Also, neither reference discloses or suggests such an intermetallic layer having a thickness of from about 50 to about 150 Angstroms. Claims 56, 58-61, and 80 depend from claim 55 and are patentable at least for such reason as well as for the additional imitations of such claims not disclosed.

Claim 57 also depends from claim 55. As may be appreciated from the discussion above regarding the deficiencies of Chan in view of Takiar and McTeer as applied to claim 81, none of the cited references disclose or

suggest the claimed annealing of the first and second layer at a temperature of greater than 400 to about 500 °C. At least for such reason, claim 57 is patentable.

Applicant herein establishes adequate reasons supporting patentability of claims 55-61 and 80-82 and requests allowance of all pending claims in the next Office Action.

Respectfully submitted,

Dated: 26 Feb 2007 By: _____

James E. Lake
Reg. No. 44,854